DOCUMENT RESUME

ED 176 676 HE 011 805

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TITLE AERA Symposium Papers 1979.
INSTITUTION American Educational Research Asscciation, Washington, D.C.
PUB DATE May 79
NOTE 68p.; Not available in paper copy due tc marginal legibility of original

EDRS PRICE MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS Colleges; Course Evaluation; *Educaticnal Technology; Faculty; Foreign Countries; *Higher Education; *Instructional Design; *Instructional Systems; *Models; Postsecondary Educatien; Universities
IDENTIFIERS *Athabasca University (Canada); Canada

ABSTRACT

Five American Educaticnal Research Association symposium papers (1979) are provided. "The Prcgram Analysis Phase of Instructional Systems Design: Details of Phase II" (E. Curtis) describes the program analysis subsystem within the ccntext of a systematic approach to instructicnal design, and reviews the process of carrying out such an analysis. "The Course Aralysis Phase of Instructional Systems Design at Athabasca University: Details of Phase III" (C. Shobe and Dan Coldeway) describes the steps which occur in the course analysis phase (phase III), identifies the personnel responsible for carrying out the steps, and discusses the expected end products and decisions which should follcw the analysis. A summary of a model currently being implemented and evaluated for determining the degree of instructional design involvement with faculty members is the focus of a paper by Dan Coldeway. "An Evaluation of the Effect of Instructicnal Systems" (Dan Coldeway) considers the effects of the application of instructional systems design at Athabasca University. The final paper "A Complex Instructional Systems Design Model for Post-Secondary Education" (Douglas Shale and Dan Coldeway) focuses on Athabasca University as the model and examines problems within the model. (PHB)

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ED176676

The Program Analysis Phase of Instructional Systems Design: Details of Phase II

First Draft

Prepared for SIG on Systems Research, A.E.R.A. Symposium #22.21

by E. Curtis, Athabasca University

UNIX File Name: ppr/aera/phase2/globals

Number of Words: 4577

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The Program Analysis Phase of Instructional Systems Design: Details of Phase II

Athabasca University, a non-traditional university which offers undergraduate courses and programs to adult Albertans "at a distance" has recently put into place a large scale Instructional Systems Design model. The model consists of six major overlapping subsystems with program analysis (Phase II) as one of the major subsystems. The objectives of this paper are to describe the program analysis subsystem within the context of a systematic approach to instructional design, and to review the process of carrying out such an analysis. The Phase II analysis of the administrative studies program at Athabasca University will be used as the primary example. The results of the analysis are briefly presented along with a discussion of the problems and the benefits in doing a program analysis for innovative and non-traditional institutions.

Introduction to I.S.D.

The concept of a systems approach to instruction or instructional systems design has come to be recognized as an important development in Instructional Science and Instructional Psychology (Coldeway, 1977). In recent years there has been an increase in the use of instructional system design models in a variety of educational contexts. The application of I.S.D. models has not been restricted to the development of instructional materials. I.S.D. models have been implemented to solve a number of instructional problems. Several people for example have commented on their use in such areas as personnel (Coldeway, 1977) course design (Butler, 1972) and curriculum planning (Silvern, 1974). Both large scale and small scale applications of I.S.D. have been shown to be useful (Coldeway, 1977).

These models are based on the premise that instruction can be designed more systematically than it has been in the past. As systems models they specify a logical, orderly sequence for the design and development of instruction. They have in common a commitment to an identifiable, integrated sequence of activities and careful co-ordination of effort between and among the activities.

The instructional systems design model adopted by the university specified the major phases as well as the expected outcomes of each, and it was then necessary to design and test the subsystems which would lead to these outcomes. According to our model, the major purpose of the program analysis subsystem was to make specific program recommendations.

A program is defined at the university as a prescription for

obtaining knowledge in a specialized field or a credential and a degree program is a group of courses which explores several areas of knowledge on issues and problems or aspects of the environment. Thus, the major task lay in developing this prescription as well as specifying courses for it. In accition it was expected that guidelines for allocating and monitoring resources would be established and target and employer groups would be identified.

The activities and outcomes of the program analysis subsystem would also have to be responsible to activities and outcomes in the other university subsystems. For example, as a result of efforts in the first major subsystem (Phase I) two major university goals were specified which would have to be incorporated as working assumptions for all further activities. More specifically, these goals stated: The university will devote most of its efforts to meeting the needs of adult Albertans.

The university will make all programs, courses and services available in accord with the open learning concept. In particular Athabasca University will seek to minimize constraints of time, place and prerequisite knowledge.

In other words programs as well as courses would have to meet the educational needs of as many people as possible and at the same time emphasize flexibility in approach.

These goals and assumptions formed the basis for all ensuing activity. As a first step, a series of questions which would have to be considered prior to the design and development of the program was formulated. For example, as an innovative institution which tries to be responsive to the needs of its students it had to determine ways of accommodating learner needs as well as institutional needs into the design of the program. In order to establish whether an educational problem existed in the program area the program analysis would have to undertake to examine the need/demand for graduates of such programs and to discover whether existing programs met the educational needs.

As the information required for each of the dimensions could be specified in advance it was also possible at this point to specify already existing information from available data sources. For example, the analysis of the need for graduates was readily obtainable from government agencies and thus these secondary data sources could be utilized in this promotion of the study. The descriptions of existing programs could be based on calendar descriptions and interviews with faculty. The analysis of existing programs and their ability to meet educational needs could be based on interviews with members of

the stakeholder groups, consisting of major employers of program graduates including representatives from three levels of government.

A list of the questions and data sources is shown in Table 1.

Table 1

Questions and Data Sources in Progam Analysis (Phase II) System

2.1 **Program Needs**

Questions
- is there a demand for people with skills in the program area?
- are graduates finding work?
- what are the enrolment patterns?

Sources
- students, graduates, employers, educators
- documents, planning projections, manpower projections

2.2 **Identify stakeholder groups and their needs**

Questions

- who are they?
- where are they located?
- what resources do they have for educational programming?
- do they have their own programs?

Sources
- association handbooks, circulars, documents

2.3 **Identify student population and their needs**

Questions
- what education level do they have?
- where are they located?
- how many are there?
- can they attend full-time?
- are they satisfied with current programs?
- do they have access to current programs?
- are their skills in demand?
- what credential do they need?

Sources
- students, graduates, employers, educators, professional groups
- documents - e.g., manpower, planning, demographic

2.4 **Identify Existing Programs**

Questions
- what programs exist?
- where are they located?
- what is their application acceptance ratio?
- what size enrolment?
- are they quota programs?

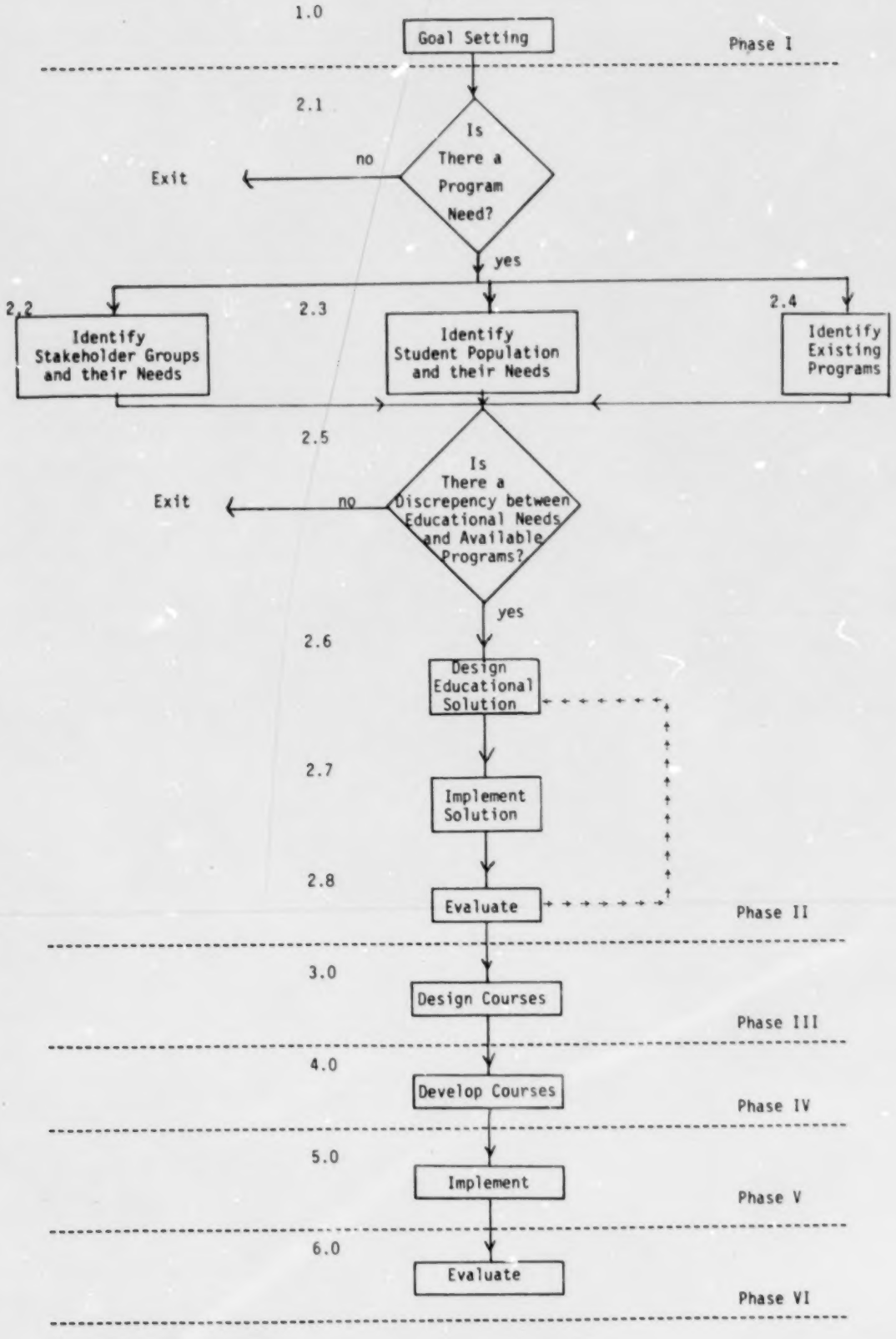

Figure 1 A.U. Program Development Model

- what credential is offered?
- what is the length of the program?
- what are the characteristics of the program? (e.g., applied, practicums, etc.) course types (proportion of Liberal to specialized)

Sources
- students, graduates, employers, educators, professional groups
- documents - e.g., calendars, course outlines, instructional materials, reports and reviews

After developing a series of questions and identifying possible data sources the questions were categorized and organized into a model to guide the program analysis effort. This is depicted in Figure 1 along with references to the previous subsystem Phase I Institutional Planning and the subsequent phases (Design, Development, Implementation and Evaluation.)

Place Figure 1 about here

Figure 1 Model to Guide the Program Analysis Effort

The first step is designed to get at the question of why the program was selected as a target for the program analysis phase and to document the need for the program. If the rationale for involvement in further program analysis activity is not validated, the effort should be terminated at this point. The next 3 steps represent information gathering activities. The major initiative is to identify the stakeholder groups and their needs, the potential student population and their needs, and finally to identify the available existing programs. A decision point is then reached wherein the data is analysed in order to determine whether a discrepancy exists between the needs and the existing programs. If a discrepancy is not found, that is, if the existing programs meet the needs the program analysis effort is terminated here. If a discrepancy is found it is necessary to identify the nature of the discrepancy and to develop a solution to deal with it. Finally the solution is implemented and evaluated.

The next section of the paper concentrates on describing each of the activities in the program analysis subsystem.

The process is illustrated with reference to the program analysis activities carried out in 1978 for an Administrative

Studies program.

2.1 Is there a program need?

The initial step in the program analysis subsystem is designed to validate the need for a specific program area. Why was this program selected for analysis in the first place? Is there a need for people with knowledge and skills in the particular program area? It is important that this step precede all further program analysis activity as it is critical to substantiate the broad needs for a program prior to becoming involved in a detailed analysis of what such a program might look like.

It was felt that if there was an adequate supply of people qualified in the program area it would be better to consider allocation of limited resources to another program in which there was a clear and identifiable need for graduates.

For the Administrative Studies program available data and studies primarily from the Statistics Branch of the Federal Government, and the planning Secretariat of Advancec Education in the provincial government was analysed. Attention was focused on full and part-time enrolment trends over the last decade and on forecasts of occupational requirements and manpower demands for Alberta for the next five years.

2.2 Identify Stakeholder Groups and their needs

Stakeholder groups are those groups of individuals who will be influenced or affected by the program planning outcomes. They are people who can make input into the program plan and are often selected as targets for analysis because of their close relationship to the student, the needs of the organization and the capabilities of existing program graduates.

The identification of stakeholder groups is critical to satisfying the university goal of meeting the needs of acult Albertans for it is only through contact with the people who have the educational needs that this goal can be met. It is also important to program acceptance (assuming a new program is the outcome of the phase II) to have these grcups includec from the start.

The stakeholder groups were identified and contactec anc through individual and group meetings their needs were documented. The stakeholder groups in the case of administrative studies were considered to be:

1. The Government which must approve of the program. In the case of Alberta this is the Department of Advanced Education and Manpower;

2. The University itself particularly with reference to its institutional mandate and goals, as well as internal resource allocation and capability.

3. The Employers (current and potential); these are the institutions, agencies, groups and individuals in the community who do or would potentially employ graduates of the hypothesized program;

4. Educators - these are the institutions, agencies, and professional associations who currently provide education and/or training or certification.

Each of these stakeholder groups can also be seer as having both roles and goals relating to programs. It is the intent of the program planning activities to icentify the goals of each group and to ensure that the goals of each group are considered during the planning activities.

2.3 Identify student population and their needs

It is not uncommon for educators to plan and develop programs first and then look for takers. "Colleges (for example) take the position that their task is to offer curriculum to those who want it, and students who want courses in crafts, child care, and investments find other agencies to provide the instruction." (Cross and Valley, p. 3)

This position ignores the vast accumulation of research which suggests that adults are "volunteers" for learning and they will not volunteer unless they can see some personal benefit from the educational experience. The antithetical position is to give first priority to the student and his needs and then design the program. This attitude, which puts the student ahead of the institution and concentrates on his needs rather than the institution's is one that has been used to characterize non-traditional institutions, (Gould, 1973) including A.U. where this latter attitude prevails. The framework of development of the University stipulates that "Athabasca University will devote most of its efforts to meeting the educational needs of adult Albertans." For this reason, this step in program analysis is designed to find out what these needs are in order to be able to design a program which will meet those needs.

The process of cefining the student population irvolves gathering information about the current status of students in

order to help define a meaningful program.

In the case of the Administrative Studies program planning the students currently enrolled in the university were informed of program planning activities and invited to indicate interest. Some of those involved in professional development activities in their jobs were also contacted. The link to students of other programs was also made through educators involved in relevant programs and through employers. Searches were made for applicable government and agency documentation relating to the needs and characteristics of current and projected needs of persons in the field.

As an example of the information discovered through these contacts it was found in the Administration area, that there were a number of professionals, such as social workers who upon advancement in their jobs to administrative positions did not have the requisite skills to perform effectively. These people did not have any particular desire for a university credential but they did need a flexible program which would allow them to study administration without giving up their jobs.

2.3 Analysis of Existing Programs

Any educational institution is a sub system which exists as part of a larger educational system. This provides an important context in program design. In Alberta, for example, the higher education system consists of 21 publicly supported institutions including four universities, six public colleges, two technical schools, five vocational training centres, three provincial colleges and one centre for fine arts and continuing education. Furthermore, there are numerous professional associations which offer professional development and training programs. Finally, there are other educational institutions existing outside the province which offer courses for Albertans.

It is not generally viewed as desirable for institutions to offer directly competing programs. Rather they are expected to provide for the range and variations in needs presumed to exist in the program area and among the stucents.

Analysis of existing programs serves several purposes. First, it provides a view of what is currently available for students. Second, it provides some insight into the program and curriculum characteristics that are perceived by the experts to be desirable and appropriate. Finally, it provides a frame of reference into which the planning of the new program can be placed.

For the Administrative Studies program this step included identification and documentation of all the related programs on the basis of information supplied through calender descriptions and interviews with people involved in the programs. Programs were compared on a number of dimensions including the accreditation offered, length of time required for completion, specializations available, stated program goals, history of program, admission requirements required, optional and elective courses, and the relative proportions of each, course sequences and prerequisites, and delivery systems.

2.4 Is there a discrepancy between educational needs and available programs?

This activity requires the judicious analysis, sorting and selecting of the data obtained through activities 2.0, 2.1, 2.2, and 2.3. Presumably, at this point, the stakeholder group and student needs have been identified and the programs intended to satisfy those needs have been described. It remains, then, only to compare the two.

The task is one of matching students and programs to determine if there is a group or groups of students whose needs are not being met by the programs offered and to decide if the institution has the resources and capability of compensating for the deficit between needs and programs. There are a number of possible findings which in turn relate to a choice of alternatives for program design. For example, one might discover through the analysis that programs do in fact meet student needs in terms of accreditation, course offerings, etc., and the student has the necessary entry requirements for the program, but the program is not accessible to the student because of space or time restrictions, that is, he may live a distance away from the centre which offers the program or may have a schedule which prevents him from attending. If this were found to be the case, the planner would have the option of offering the program but delivering it in a way which makes it available to the target student population.

To take another example, one might discover that the existing programs are inadequate on some dimension, perhaps in content, instructional quality or evaluation. Given this situation a program could be designed which is superior in some way to the existing programs. That is, improved adequacy would be the goal to meeting the learners' needs.

Finally, a meaningful program may simply not be available. If this is found to be the case, it is necessary to consider the alternative of developing a new program.

In summary, accessibility, availability and adequacy are the three criteria used in this step to determine the match between existing programs and learner needs. There is a further issue to consider at this stage and this involves the possibility that parts of other programs may be accessible, adequate or available and it may be possible to enter into association with another institution and jointly offer a program. This involves many political as well as practical considerations which provide additional challenge to the planners.

In the case of the Administrative Studies program both adequacy and accessibility turned out to be important criteria. For example, on the basis of information supplied by the stakeholder groups the relative weighting of theoretical versus applied courses proved to be a major criticism of existing programs.

2.5 Design an Educational Solution

Having given consideration in the previous stage to the variables of program design which might have to be manipulated in order to meet student needs it is now time to select a solution and to analyze the resources and constraints of the institution in implementing the solution.

It is important to recognize that which the program analysis system is initiated with the expectation that a program proposal will result, there is nothing in the model which says that a program proposal must result. Rather the data collected determines the outcomes. For example, the analysis may not reveal a discrepancy between needs and programs in which case further program planning is terminated. If it reveals that accessibility is the only criteria missing from existing programs one solution might be to adopt a given program and change its delivery mode to increase accessiblity. One could adopt the program with minor revision or adopt a program with major revisions to instructional stategies. The data may, however, indicate the need for a new program in which case the program analysis then proceeds to create a design for the new program.

Thus, new program design is the only possible outcome of the program analysis activity. It is in this respect that the systems approach evidences a major deviation from traditional approaches.

In the case of the Administrative Studies program analysis, it was discovered that there were several unfulfilled needs in administrative studies which could only be addressed by new program development. Interestingly a corresponding phase

II analysis for the human services area revealed the need for several different strategies, none of which indicated development of a new program.

The design of a solution also has to take into account the other subsystems of the institution as well as external groups, agencies and institutions. For example, the development of a new program in Administrative Studies forced a consideration of resource requirements which would have to draw on other systems for such acitivities as course development and delivery. It immediately focuses consideration of the issue of transfer arrangements and thus necessitates cooperation and participation of A.U.'s administration and Registrar's office as well as appropriate individuals from the transfer institution.

2.6 **Implement Solution and 2.8 Evaluate Solution**

These activities necessarily are final phase II activities and represent ongoing phase II functions. The process of implementation requires firstly formal approval of the solution and then allocation of resources and a management plan for implementation. In the case of Administrative Studies the outcome of phase II was a program proposal and therefore the process of implementation proceeded to phase III activity.

The evaluation of the solution proceeded both internally and externally, that is, academic staff and committees within the university reviewed the program proposal. In addition a series of meetings were held with each of the stakeholder groups including the government which had to approve the proposal, other universities and colleges, and employer groups.

Discussion

While the University assigned administrative studies as a target for Phase II analysis, we emphasize that the assignment of this specific target area for study represented a tentative commitment rather than a confirmed obligation to act. The initiation of Phase II does not guarantee that the University will commit resources to the development of the program area.

The systems methodology in the context of Phase II for Administrative Studies prescribes essentially an attitude and basic strategy without specifying, in detail, each step or procedure. In fact, the procedures may vary considerably depending on the area targeted for study and the available resources in the area. For example, there existed considerable documentation on the need and demand for graduates in Administrative Studies and

so it was possible to rely heavily on secondary data sources. If a program were being considered for a new kind of professional this would not be available and alternative procedures would have to be developed.

All of the activity described can be viewed within a context of Phase II as a subsystem within a larger university system which exists within the context of external educational, social, political and economic influences.

The importance of this context in a systems approach is in making explicit the need to attend to the interactions and influences among the various university subsystems and its external environment. In both the early and final stages of Phase II the most important interactions are those with the University system as a whole, which specified the goals and the program areas, and the interaction with external influences such as the social, economic, and political realities which impinge upon such things as the career and employment prospects of potential students, the certifiability and standards for graduates and the resources available for their education.

The methodology then prescribed within this system approach specifies attention to other systems and influences, and demands that planning be based upon data gathered from all relevant sources.

The data gathered for the Administrative Studies Phase II revealed a considerable increase in enrolments in the applied field and a corresponding demand for graduates. The analysis of existing programs revealed a curriculum sequence which was strikingly similar among the 35 existing programs in selection, sequence and content of instruction. There was very little variation from program to program in the instructional strategies used to teach the curriculum and the delivery systems to support the instruction. These findings, in addition to the observations of the stakeholder group, supported the conclusion that an alternative program was needed and the data led to a curriculum structure which would have at its core a required set of generic skills courses in addition to cognate and liberal arts courses. In terms of instructional strategies it was recommended that the core courses be offered within the framework of a competency-based approach to education, and in terms of delivery, it was recommended that a wide variety of delivery modes be utilized on an experimental basis - including possible cooperation with other institutions. This structure was found to provide considerable flexibility and proved to be an effective solution to accommodating a wide range of educational needs. On the basis of the analysis stage it was possible to specify work required along with timelines, personal, and budget, which would have to allocated to develop and imple-

ment the program.

In conclusion, this program planning activity provides a particularly distinct example of the way in which the use of systems methodology allows for data responsive design, rather than, as is sometimes the case with traditional methodology, the design strategy defining the program independent of the existing data. In different program analysis activities it is possible that there is a common purpose in the activity in that the same sets of information are drawn upon and the same variables are considered. The program design outcomes are, however, unique and determined by the data obtained during the planning process rather than by a preconceived set towards either the problems which were thought to exist or the solutions which were seen to be available.

A strength in the use of systems methodology in program planning is the relative ease with which new data can be inserted within the basic struture and process. If, at some time after the initial analysis occurs, there is a substantial change in one or more variables, then the process can be reactivated to accommodate the change. For example, there may be some reorganization or emergence of need within the stakeholder groups which did not exist or was not visible during the initial analysis. If that should occur then it is possible to address the same questions to this specific need or group and to make changes in decisions on the basis of the data obtained.

Conclusion

The processes of analysing needs, specifying curriculum, and determining general program parameters occurs in most post-secondary institutions. However, the integration of needs data, user information, and specific curriculum structure leading to the actual selection and design of courses is relatively unique. Many attempts fail to handle this multivariate problem in order to produce a curriculum plan which will allow course teams (instructional designers and subject matter experts) to move directly into course analysis (Phase III course analysis). Athabasca University's experience with a Phase II program analysis demonstrates the importance of employing a complex ISD model on a university wide basis. The results of this application of Phase II within ISD demonstrates the potential such activity has with respect to management, administration, instructional design, and budget determinations. It also indicates the power such an approach has for capitalizing upon existing data resources and the curriculum planning work already completed by other institutions.

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The Course Analysis Phase of Instructional Systems Design at Athabasca University: Details of Phase III

Second Draft

Prepared for SIG on Systems Research, A.E.R.A. Symposium #22.21

by C. Shobe, Dan O. Coldeway, Athabasca University

UNIX File Name: ppr/aera/phase3/globals

Number of Words: 2496

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Abstract

The Phase III (Course Analysis) process at Athabasca University represents an important analytical interface between general program planning and specific course development activities which facilitates the development of effective courses by encouraging rigorous advance planning of course development activities and resource requirements. It has led to a marked improvement in the efficiency of Athabasca University's overall operations and an enhancement of the quality of its instructional products. Phase III procedures are consistent with the sophisticated instructional technologies now emerging and are critical to the successful systematic operation of this distance-education University.

Introduction

In the ISD model (Coldeway, 1977) employed by Athabasca University (Shale and Coldeway, 1979; Coldeway, 1979), Phase II (Program Analysis) provides information about the need for new or alternate instructional programs. Where need for a new program is demonstrated, the analysis process also provides program-specific definitions and recommendations, identifying specific courses or course areas required in the program. Resource guidelines, project monitoring procedures, and probable client groups for the program are also identified in the Phase II report (Curtis, 1979).

The next step in the ISD process, Phase III (Course Analysis), consists of a detailed course development feasibility stucy in a specific content area defined by the Phase II Program Plan.

The purposes of this paper are: to describe the steps which occur during Phase III (Course Analysis); to identify the personnel responsible for carrying out those steps; and, to describe the expected end products and decisions which should follow upon this analysis.

Rationale for Phase III

The determination of course objectives and content boundaries is a ''project control'' phase in most ISD models, since the specifications of content and instructional objectives provides

course developers with guides to the selection of course materials and the development of instructional and assessment strategies (Filbeck, 1974). However, considerably more information than this is required for effective project planning, in a materials-based, distance education system.

The function of Phase III (Course Analysis) at Athabasca University is to describe in detail the academic and administrative information prerequisite to an effective, efficient course development process. These academic and administrative specifications serve as quality control criteria for decision-making prior to, during and subsequent to the actual course development process. The end-product of Phase III - a detailed project proposal (Phase III Report) - allows for reasoned project approval and modification decisions to be made on the basis of both academic/instructional and resource/administrative grounds, prior to and during the course development phase. Once the Phase III Report is approved and the development project is initiated, the specifications contained in the approved Phase III Report serve a "project control" function, restricting changes in course parameters. Thus, the Phase III Report becomes a course blueprint which specifies terminal and enabling course objectives, instructional materials, content parameters, resource requirements for course development, a management plan for the development, production and delivery of the course, and a course evaluation

plan.

Initiating Phase III Analysis

In practise, Phase III analyses are initiated in two ways - either as a direct consequence of a Phase II Program Plan, or as an independent project. In the former instance, specific course areas defined during Phase II are selected for detailed analysis based upon overall development priorities included in the Phase II Program plan. Making this a primary method of project selection ensures that reasonable intermediate-term operational planning (two to four years) based on established institutional priorities occurs as a matter of course. A proportion of the institution's course design and development capacity is also set aside to accommodate innovative course proposals which do not derive from existing program plans. Providing this type of flexibility within system planning and development procedures increases the complexity of the monitoring and management process, but also provides important opportunities for pilot testing in new program areas and for responding quickly to relatively unique (perhaps topical) educational needs when they arise.

Regardless of how a Phase III project is initiated the initiating action is a budget decision to underwrite at a particular time the costs of the analysis. For courses deriving from established program plans this decision will be something of a

formality, since the institution's operating budget should be predicated on the basis of those program plans. Proposals evolving from the "innovative project" route will likely be competing for financial support and a project selection mechanism involving the institution's management team is required.

Once a project is approved for Phase III analysis, it proceeds through the analysis process in a manner consistent with all other courses regardless of the manner of origination.

The Phase III Process

The first operational step in the process involves the establishment and orientation of the analysis team (Colceway, 1978). The minimal team would consist of a subject matter expert and an instructional designer, while a complete team would consist of those two professionals plus an editor, a technical production specialist and a project manager. For very large or complex projects, more than one person might be involved from each of these areas of expertise.

The analysis team is acquainted with the requirements and processes of Phase III, the objectives of the specific analysis task at hand and the resources available to the team. The team members are also made aware of project restrictions which derive from the Phase II Program Plan, (or from the innovative project proposal in such cases). This is a critical stage in

the analysis process since the interpersonal consicerations discussed by Forman and Richardson (1977) in relation to course development teams are equally relevant to the course analysis process.

Once team members are familiar with their mission and the restrictions on it, and once they begin to be comfortable with their individual and collective roles in the process, the work of Phase III can begin. One aspect of that work - the task analysis process in which a needs analysis drives the formulation of detailed course content outlines, terminal and enabling instructional objectives, and instructional and student assessment strategies - has become a fairly standard instructional design methodology and will not be discussed in detail in this report. Of somewhat greater interest are the Phase III procedures for matching instructional materials to the content and instructional parameters defined by task analysis, and determining project schedules and resources required to complete the project.

Materials Identification and Evaluation

The members of the analysis team make extensive use of library search techniques, particularly bibliographical searches, to identify instructional materials that may be appropriate for the course. In addition, team members review course lists from institutions known to be producing instruction with a strong

materials base either for on-campus use or for teaching at a distance. In the latter instance, course titles which seem to be directly related to the area of analysis are identified and requests for additional information about the courses including copies of the course materials are transmitted.

As a general aside, it has been found that these course-specific inquiries usually elicit detailed course outlines, statements of course objectives, and lists of instructional materials utilized within the instructional package. Rarely is information received regarding the acceptability of the course by other institutions, the effectiveness of the instructional strategies used in the course and its success in promoting student learning. When such material is received, it is often very difficult to interpret because information about the student population is absent, and because of the diverse ways in which institutions quantify registrations, rates of student progress and course completion rates. As a consequence, the analysis team must carry out very detailed reviews of the course packages, including in some instances a review by test students, to determine the utility of the complete course package to the institution. In addition, information must be gathered regarding the long-term availability of the course, the cost of purchasing the components of the course, and the anticipated date of revision for the course and any of its sub-components.

Each member of the analysis team reviews potentially useful instructional materials from their individual professional perspectives. The subject matter expert carries out a content validation exercise - an assessment of the degree to which the instructional materials cover the content parameters defined for the course and a determination of the requirements for prerequisite and corequisite materials or instruction. An editor, if involved, will review the instructional materials to assess readability levels, the general organization of materials, and the effectiveness and clarity of communication. Copyright clearance issues will also be examined. Depending upon whether the course materials are to be purchased or reproduced, a visual designer will explore the production problems that might be anticipated. The instructional designer will review the implicit and explicit instructional methodologies and objectives, the mix of media used in relation to the stated instructional objectives, the match between instructional objectives, student assessment, course content and practise activities, and the match between the characteristics of the course and the stated needs of the target student body.

The analysis team will then jointly review their individual assessments of the instructional materials and a team decision will be reached regarding which instructional materials will be adopted for the course.

Project Design

The next step in the Phase III analysis process involves the establishment of detailed specifications for the development, production, delivery and evaluation of the course. By this stage, team members have assembled a considerable amount of detailed information about program requirements, characteristics and educational needs of the presumed learner population, characteristics of the accepted instructional materials, and the administrative and operational constraints of the institution.

Any gaps that may exist in the course content and supporting instructional materials and strategies will have been identified, and the team should be able to begin to define what additional course materials must be produced (and in what form - e.g. print, audio, video). The required instructional strategies will have been identified and the supporting delivery system described (e.g., whether tutors, laboratories, seminars, etc., are required). Depending upon the kinds of additional materials that must be produced (a simple study guide to existing materials, or a newly authored textbook/work-book; a ten minute audio tape, or twelve, thirty-minute television programs) the technical production requirements of the project must also be elaborated at this stage. Finally, since no project ever seems to take form without an element of dispute over the choice of directions in one area or another, a course

evaluation mechanism must be planned that will facilitate objective course review and subsequent revision recommendations.

Review of Phase III Reports

The academic/instructional plan for the course and the resource allocation plan for the course development project, developed as described above, are ultimately combined into a Phase III Report which is forwarded to the academic management group of the institution for preliminary review. This review is usually carried out by individuals with expertise similar to those encompassed by the analysis team and is a quality control mechanism which ensures validity of the academic, instructional, and resource decisions innerent in the project proposal.

While the management group is concerned by all of these issues, its principle concern is for the resource implications of the project. Therefore, the Phase III Report is also forwardec to an academic policy committe for a review of the prcposed academic and instructional parameters of the course.

A two-stage decision is recuired at this point. First, the academic policy committee must approve the course proposal as being legitimate within the academic framework of the institution. As with all other Universities, this academic approval is

required before a course can be offered by Athabasca University. Given that approval, however, the management committee is authorized to initiate the development of the course at any time, subject to the availability of resources.

Normally, the Phase III report will specify the composition of the course development team (which will usually be similar to that in the course analysis team); the content, instructional design and instructional materials; the development and production schedule; the delivery system; the course evaluation system; and the management process which unites these diverse factors. Once the Phase III Report is approved, it becomes a blueprint for the course which cannot be altered in a significant way except via a formal review process.

Experiences at Athabasca University

Since the phased ISD model for program and course planning and development was instituted at Athabasca University, there has been a significant increase in the productive capability of the institution, and in the quality of the instructional materials produced. In particular there has been a marked decrease in the cost per course project for development of instructional materials. As well, greater flexibility has been introduced into nearly all aspects of course design and development, more effective procedures for integrating the design of course evaluation procedures into course development activities have

also been devised, and more flexibility in the utilization (through adaptation) of instructional materials produced by other institutions is evident. The Phase III process is evolving, as are all other aspects of Athabasca University operations, becoming much more simplified and effective as the institution's experience in utilizing this approach increases.

Since the evaluation of materials produced by other institutions is a large undertaking, many of Athabasca University's resources are tied up in this process and the University is continuing to encourage the establishment of consortia among institutions involved in the development of distance learning materials. One of the major purposes of such consortia would be to ensure that consistent course evaluation procedures and course materials analyses are undertaken, and that the resulting data are made available to other institutions interested in purchasing (or otherwise sharing) well-designed instructional materials.

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28 May 1979

AERA Paper

TM

Degree of Instructional Design

Involvement with Faculty Members

First Draft

Prepared for AERA

by Dan O. Coldeway, Athabasca University

UNIX File Name: ppr/aera/instdes/globals

Number of Words: 2121

Paper presented at the annual meeting of the American Educational Research Association for the Special Interest Group on Faculty and Instructional Development Symposium, session #15.27.

Instructional designers who are connected in some way to post-secondary institutions most often times find themselves in many roles. They are often teachers, consultants, researchers, administrators, colleagues, learners, and observers, sometimes engaging in all of these roles in the same day or week. As if moving from one role to another role is not difficult enough, the problem is made more complicated due to the fact that many instructional designers are viewed by themselves and others as "change agents" or "innovators". Moreover, the role of change agent appears to cut across all of the other roles. The result is a very complicated professional existence which can place a great amount of strain on the instructional designer and the organization which supports instructional design.

The above problem is clearly exemplified by the instructional design staff at Athabasca University. Seven full time instructional designers are employed at Athabasca University and function in each of the above roles including the more generic role of "change agent." These professionals are expected to provide their expertise to a variety of institutional, program, and course related problems while attempting to maximize the growth and total output (e.g., programs and courses) of the institution. To complicate the problem further these I.D.'s are expected to work in a variety of disciplines, with persons both inside and outside of the institution, and with persons with a wide variety of skills and tolerance for a systematic instructional design process. In general, almost every conceivable instructional problem must be addressed by these I.D.'s as they endeavour to improve the efficiency and effectiveness of the institution's instructional system.

This paper summarizes a model currently being implemented and evaluated for determining the degree of instructional design involvement with faculty members at Athabasca University. The model was designed and put into place in an attempt to better organize and select the type and amount of instructional expertise required for each problem faced by the instructional design staff. The model was also implemented in an attempt to more clearly define the "change agent" role. As Geis (1977) pointed out in his paper describing the problems associated with making change in post-secondary educational settings, the change agent must attempt to work with the "model of teaching" rather than the "techniques of teaching". Because many of the problems encountered by the Instructional Design staff at Athabasca University cannot be dealt with realistically through an improved model of teaching, but still require the attention of instructional designers, a model was put into place which attempted to define this difference and communicate it widely.

The Importance of Degrees of Involvement

Having a model and method for describing and assigning the degree of involvement with faculty is important for several reasons. First, it can serve to protect the instructional designer from unfair and misplaced criticism they do not deserve. Many instructional designers find themselves in positions that do not allow them to exercise their instructional systems design expertise even though they still become associated with the project and its resulting products. Since many of these types of projects can be predicted before work begins (e.g., we don't want it done right, we want it Thursday, etc.) a model defining degree of involvement can become a mechanism which allows the I.D. to become associated with the project while still offering some professional protection from later criticism. Second, the model can be used to help faculty determine the degree of instructional support they require and what that level of support means with respect to their role and the I.D.'s role in the process. Faculty get a type of "preview" of what may happen if they opt for more I.D. involvement on a project and they can weigh that against their existing values, attitudes, and philosophy regarding students, courses, programs, etc. Third, the model makes the task of managing and allocating instructional designers' time and expertise much clearer. It's possible to predict the amount of time which might be involved in a project and the number of projects an individual I.D. can handle based upon the degree of involvement that has been defined. Deviations from that prediction can be detected sooner and dealt with much more directly. Finally, the model allows a type of "shaping process" to occur. That is, faculty responses consistent with a greater degree of instructional involvement can be differentially reinforced over time. The naive faculty member need not "buy in" to all that is required in instructional systems design from the beginning. Trust and confidence can be built up over time with the faculty members being exposed to systematically larger and larger doses as he/she is prepared to accept them. The model can be used to determine the sequence of exposure to instructional systems design.

A Model for Determining the Degree of I.D. Involvement

The model currently being used to determine the degree of ID involvement at Athabasca University is shown in figure one. That model utilizes two dimensions; one describing the degree of involvement and the second representing the major sub-systems within the Instructional Systems Design model currently in place at Athabasca University (Coldeway, 1978;1979). The two dimensional model allows for a clear specification of degree of involvement of ID's at each point in the overall instructional process (i.e., from analysis to evaluation) and for a variety of specialized functions (e.g., training/orientation of faculty members, curriculum analysis, etc.)

The degree of involvement dimension of the model can be defined as follows:

a. Total ID Involvement: Project in this category will closely follow an instructional systems design paradigm under the direction and supervision of the instructional designer. The courses and/or programs dealt with using this approach will emphasize a criterion referenced instructional philosophy attempting to focus on competencies whenever possible. An objective description of course objectives will be used as guides to the design, development, preparation, selection, implementation and evaluation of all instructional materials and procedures.

b. ID Consultant: Projects in this category receive instructional design expertise and assistance in almost all phases of the ISD process. The ID assists in the analysis, design, development, preparation, selection, implementation, and evaluation of course materials and procedures although the course or program under consideration may not strictly follow a criterion referenced instructional philosophy. In general, the role of the instructional designer is to ensure that the course or program is better organized, that students are kept in an active role while learning, and that the course objectives, instructional materials, and assessment instruments have some degree of relationship with each other and the general goals of the course.

c. ID Advisor: Projects in this category do not necessarily receive instructional design assistance in each phase of the ISD model. When assistance is given it may only be adjunct to the main processes of the course or program. This assistance is not given on a continual basis and would only be available as requested by other members of the course or program team. The course or program may not require any substantive input from an instructional designer although the instructional designer is "on call" when needed.

It should be noted that although each of the above descriptions appear to be somewhat distinct categories, the degree of actual involvement with any project is better described as a continuum rather than distinct steps. That is, it's possible to be somewhere between total ID involvement and the ID consulting role on any of the ISD phases. Moreover, it's possible to have total ID involvement at one phase and a lesser degree of involvement at another phase. However, often the level of first involvement with a faculty member (i.e., during the analysis phase) determines the subsequent levels of involvement.

<u>Outside factors which Influence the degree of ID Involvement</u>

Many factors other than the attitudes and philosophy of the individual faculty member influence the degree of ID involvement on a given project. Many of the more important of these outside factors involve the organizational and reinforcement systems of the institution. For example, the consequences to the individual faculty member for getting involved in and with instructional systems design are important. Even at Athabasca University where the stated and explicit instructional philosophy focuses on the importance of instructional systems design, other factors become important. A list of several of the more important outside factors influencing the degree of involvement with faculty are listed below:

a. Faculty accountability for student success in courses (i.e., attrition, completion, performance, and student attitude).

b. Cybernetic feedback systems which focus on student behaviour as important in revision of materials and procedures and in the assessment of faculty effectiveness.

c. Organizational and scheduling structures which allow for the use of feedback in revision by faculty.

d. Institutional reporting systems which focus on student performance and learning outcomes as the prime metric of concern rather than number of course enrollments, number of courses, etc.

e. Faculty incentive systems which encourage innovation and systematization by reinforcing faculty who are more successful in reaching students.

f. An institutional commitment to the idea that the majority of students enrolled should have an equal opportunity to master course content and learn relevant skills and ideas rather than simply be exposed to content and rank ordered according to performance on examinations.

The degree of ID involvement with faculty members is also controlled to some degree (in many cases to a large degree) by what goes on in other post-secondary institutions. That is, a faculty member's reluctance to re-examine content, use alternative teaching methods, more carefully consider the needs of students, etc., is often attributed to their fear that other institutions may not accept the course for transfer, the course will not remain "at the university level," or other such concerns. Many faculty are simply not prepared to do something in a different form or style when other faculty colleagues do not find such activity appropriate. Even in non-traditional institutions the need to "gain credibility" makes the instructional designer's role a diffi-

cult one.

The Range of ID Involvement

The range of ID involvement varies considerably from project to project. At Athabasca University, the range of involvement almost covers the entire spectrum from total involvement in all phases to no involvement at all (see Figure Two). However, ID involvement occurs at some level in most projects, especially in the course analysis, design, development, and project management phases. Increasingly, more ID involvement is beginning to occur in other areas as well. The need for ID expertise is becoming apparent in the curriculum planning efforts and in the general planning of the institution. Although these types of activities do not necessarily involve the relationship between the ID and an individual faculty member (i.e., they often involve the relationship between the ID and a committee or a group of administrators), they are affected by the variables already described to be important in determining the importance and amount of ID involvement.

It should be noted that total ID involvement in some phases and activities would not be ideal. That is, activities related to physical production of course materials, training and orientation of faculty, and the actual day-to-day management of projects often require expertise not necessarily in the repertoire of the ID. Moreover, these functions are often best accomplished by persons outside of the ID role, leaving more time for the ID to engage in other more relevant activity.

Conclusion

This paper has suggested that a model which describes the degree of ID involvement with faculty members can be a useful tool for educational change and instructional management. Experiences with such a model at Athabasca University over the last year have demonstrated that the model can be used for a variety of purposes while serving to provide clarity to the importance and characteristics of "applied instructional systems design technology."

Such an approach also allows instructional designers to encourage and promote educational change while still "getting the job done." Such a combination is an important requirement for institutions facing the political and societal demands for increased enrollments, more courses, and little time for changing the funding structures under which all activity must eventually succumb.

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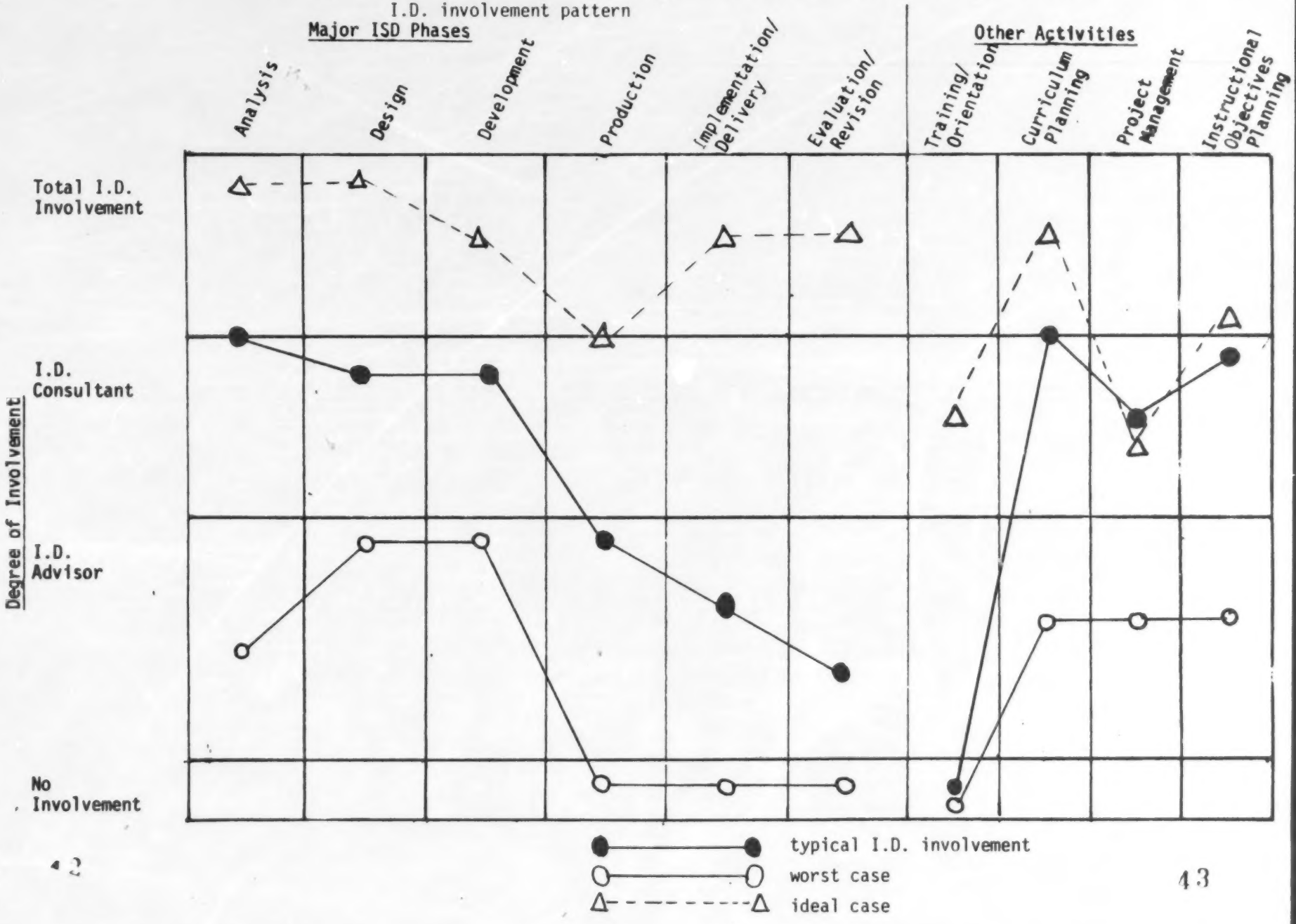
Degree of Involvement	Major ISD Phases						Other Activities			
	Analysis	Design	Development	Production	Implementation/ Delivery	Evaluation/ Revision	Training/ Orientation	Curriculum Planning	Project Management	Instructional Objectives Planning
Total I.D. Involvement										
I.D. Consultant										
I.D. Advisor										
No Involvement										

Figure Two: Degree of I.D. Involvement model showing potential Athabasca University I.D. involvement pattern



28 May 1979

AERA Paper

An Evaluation of the Effect of

Instructional Systems

First Draft

Prepared for SIG on Systems Research, A.E.R.A. Symposium #22.21

by Dan C. Coldeway, Athabasca University

UNIX File Name: ppr/aera/inst.sys/globals

Number of Words: 4329

HE 011 805

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An Evaluation Of The Effect Of Instructional Systems Design In a University Context

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This paper describes the effects of the application of Instructional Systems Design (ISD) at Athabasca University. A complex ISD model was put into place in a university wide effort to improve the efficiency and rate of course design, the quality of all design and planning efforts, and the management of all activity. The results indicate that such an approach produced favourable results and increased the productivity of the institution. A detailed discussion of the specific effects of the ISD model is presented along with implications such an approach has for other institutions.

28 May 1979 AERA Paper

An Evaluation of Instructional Systems Design In A University Context

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The concept of Instructional Systems Design and a description of the processes important in the applications of such an approach have been well documented (Coldeway, 1977; 1978; Silvern, 1972). An examination of a variety of Instructional Systems Design models indicates that many similarities exist between the terms and variables included in most models. However, as was indicated by Stolovich, (1976) new directions in ISD model building are needed to improve upon ISD and make the general approach applicable to the variety of educational situations encountered by workers in the field. Stolovich suggested that the following concerns be addressed: 1) alternative models be suggested; 2) micro-modelling with sub-elements of the overall model be addressed; 3) more exchange between model builders for cross-referencing purposes; and 4) a more careful evaluation of models in order to validate their effectiveness. The purpose of this paper is to provide information in response to the above four factors using the present Athabasca University Instructional Systems Design model as a case study example.

In early Fall, 1977, Athabasca University implemented a complex ISD model in an effort to increase the rate of course development, determine the proper allocation of staff and time, better organize the curriculum planning and design and allow the university to more carefully evaluate its approach to curriculum and course development. The overall steps of this ISD model are shown in figure one.

The ISD model was put into place by the university as a university wide model to be followed in all curriculum and course development efforts. Although many of the details (sub-elements of each step in the model) were determined as a particular step was being implemented, a large proportion of the model and procedures were established at the original time of implementation. The assignment of personnel at the university was done in response to the ISD model and their activity guided by the procedures described by each sub-system in the overall model. The entire process was supervised by the President and Vice-President of the university through the directors of units responsible for the activity corresponding to the steps in the ISD model.

The information included in this paper represent the current effects of the implementation of the ISD model at Athabasca University over a one year period. During this time the univer-

sity had the opportunity to engage in each sub-system within the overall model. Sources of data include the following: 1) number of courses ready for delivery in comparison to university expectations; 2) quality and readiness of curriculum reports in comparison to university expectations; 3) reports of managers and directors regarding efficiency of management in comparison to previous experience; 4) problems encountered with the model and problems solved by adjustments to the model; and 5) effects of the implementation of the model to non-instructional units.

Phase One: (Long Range Planning)

Phase One, the development of a long range plan for the institution, had already been underway when the ISD model was put into place. Considerable attention toward the completion of a document entitled "A Framework for Development" had already occurred allowing the institution to become much more specific about its direction over a 5 year time span. The formal establishment of a long range planning phase in the ISD model confirmed the importance of the planning efforts which had already occurred and also allowed the institution to further define operational objectives for a shorter 24 month period.

The establishment of the ISD model also provided considerable clarity to the relationship between long range planning (phase one) and program planning (phase two). Because the phase one efforts isolated program areas of interest to the university, it was possible to use that information to drive the phase two program analysis efforts. That is, the Framework for Development needed only to identify areas of interest to the institution during phase one given that the details and structure of the program areas would be specified during phase two.

Phase II (Program Analysis)

One of the most important effects of establishing an I.S.D. model at Athabasca University was in the area of program analysis (i.e., curriculum planning). Prior to the establishment of the I.S.D. model, program analysis was done in somewhat of a haphazard and non-systematic manner. That is, various sub-groups within the institution periodically considered the structure of programs and periodically produced documentation describing various program structures. The specific procedures and methodology for conducting a thorough and comprehensive program analysis in any area was not clear. Moreover, the assignment of staff and personnel to conduct that analysis and the management of these tasks was also totally unclear prior to the establishment of the I.S.D. model.

The establishment of the I.S.D. model allowed the institution to focus its attention in the program analysis area in several ways.

First, based on the results of the Phase I long range plan it was possible to pinpoint program areas that required further analysis. The institution was therefore placed in a position of deciding which of these areas would receive attention and when reports making recommendations about program planning would be available. Second, the specific assignment of personnel to program analysis activities could be made. Third, although the specific methodology for conducting a program analysis was not established along with the I.S.D. model, the establishment of the I.S.D. model allowed the people assigned to conduct program analyses to formulate procedures and methods useful in producing the desired end products of Phase II. Finally, the establishment of the I.S.D. model allowed the institution to begin program analysis efforts in areas in which existing course programming did not exist. For example, the institution was able to investigate the needs, structure and basic framework for an Administrative Studies program and the potential for a Helping Services program, even though courses, students and faculty in these areas were not currently a part of the institutional system.

The Phase II program analysis efforts were highly successful in allowing the institution to make decisions regarding its future course and program offerings. The analysis activity originally began in four major areas:

1. The analysis of the Liberal Studies curriculum areacy being offered by Athabasca University.

2. The analysis of a program of special interest courses for adult learners.

3. The program analysis in the Administrative Studies area.

4. The program analysis in the Helping Services area.

Individuals were assigned to begin Phase II activity in all of the above four areas with the intention of producing reports and documentation describing the possibility of the institution getting involved in all or a portion of the areas listed. The following results were obtained. First, program analysis efforts in the Liberal Studies area and the special interest adult education area were discontinued in favor of completing the basic undergraduate transfer program at the institution and delaying further analysis in the Liberal Studies area until those basic needs were met. The I.S.D. model was instrumental in forcing such a decision to be made due to the fact that insufficient data was available to complete the analysis in either of the above two areas in the time frame specified. Second, program analysis in the Admin-

istrative Studies area was conducted and resulted in a comprehensive program plan for an undergraduate degree program in Administrative Studies. This program plan was subsequently submitted for program approval by government and was subsequently approved as a degree program at Athabasca University. Third, the program analysis efforts in the Helping Services area indicated that considerably more time and effort was needed in order to resolve the complicated problems facing the disciplines who make up the Helping Services professions. The analysis revealed that it would be possible to generate a core program applicable to all Helping Services professionals but that such a program would probably not be easily accepted by many groups and that time and effort in working with these groups prior to the establishment of the program was necessary. In general all of the activity in the Phase II program analysis area yielded results useful in advancing the University along several curricular fronts. Even the decisions to abandon analysis efforts or abandon programming efforts in a particular area were meaningful with respect to institutional planning given limited budget and resource allocations.

The separation of program analysis efforts (phase two) from course analysis and design efforts (phases three and four) allowed for the allocation of personnel to all efforts without overloading key individuals. Without a clear separation of effort, program analysis often receives considerably less attention and often results in an inferior product. The results of the phase II efforts clearly indicate that a meaningful product could be obtained according to a specific time and management plan, allowing the institutional decision making process on the selection of course analysis, design, and development activities to occur according to a tight schedule. Such information is especially important in planning for budget submissions and requests.

Phase III (Course Analysis)

One of the most important changes that resulted from the implementation of an ISD model at Athabasca University was the analysis of courses prior to the actual start of course design and development. The introduction of the phase III course analysis sub-system allowed the institution to "preview" each course before approval was made to begin the more expensive design and development phase.

Aside from the obvious need to do a thorough analysis of course objectives prior to instructional design and development, the phase III analysis activity also provided information useful for the management and planning of both the course design and development (phase IV) and production

(phase V). Moreover, phase III course analysis efforts could be managed as direct activities involving a variety of professionals. That is, it became possible to schedule the phase III course analysis of several courses even though the institution was aware that only a subset of those courses analyzed could be put into design and development. Since the decision to go ahead with design and development (i.e., go into phase IV) was contingent upon a satisfactory and complete phase III report being ready and approved, the number of courses being entered into phase IV was predicted to always be less than the number of courses entered into phase III. As the information show in figure one indicates, this reduction was in fact supported by data. Many courses deemed important by the phase II program analysis efforts and entered into phase III were not approved for phase IV design and development. Although there were many reasons why a course was not allowed to continue to phase IV, the majority of rejections were a function of the following problems:

a. the phase III plan was directed toward the use of an existing course package which was either not available to the university or was unsatisfactory for the university's students or system.

b. the plan for designing and developing the course or the anticipated plan for delivering the course was deemed unsatisfactory (e.g., the costs were too high or the content was not clearly specified).

Although considerably more evaluation of the importance of the phase III approval mechanism to the probability of a successful course in phase IV is necessary, it appears that this process has greatly increased the quality of selection of courses for entry into later phases in the ISD model. Furthermore, the importance of phase III course analysis activity to professionals both inside and outside of the instructional design staff was apparent. Since the rejection of a phase III report was a possibility, especially if that report was incomplete or appeared unrealistic, course teams quickly began to take the phase III analysis efforts seriously and strived to accurately answer the range of questions required of a good phase III analysis. Requests for assistance and documentation describing the phase III analysis requirements grew steadily from the time of initiation of the ISD model.

Phase IV (Course Design and Development)

Figure one also summarizes the flow of courses through phase IV. As was mentioned earlier, design and development success

was greatly increased through the careful review of phase III course analysis efforts and the selection of only those courses which met phase III requirements.

Although the original ISD model and the information in figure one suggest that phases IV and V were quite independent, in reality they were almost totally overlapping and confounced. That is, entire courses did not process completely through phase IV before they were approved to go into phase V. In many cases the quality control of phase IV end-products was non-existent or rested entirely with the course team members responsible for the course. Credit blocks and even units of instruction were often entered into production and actually made ready for distribution for the student before work began on subsequent credit blocks or units. In some cases credit blocks and/or units were reviewed carefully by a variety of people before they entered production and in other cases they were entered into production, printed and put on the shelf, ready for distribution as if that was the goal of phase IV (i.e., no separation of functions at all).

Given the above phenomenon, the utility and rationale for a separation of sub-systems between the design and development phase and the production phase remains questionable. Formal and rigorous reviews of phase IV type products before they are entered into phase V appears to make the system too cumbersome and slow. In contrast, issues of quality of phase IV products still plague many of the professionals involved in both phases IV and V. Moreover, intermediate checkpoints relevant to production demands (e.g., number of pages, printing requirements, media requirements, etc.) appear to be necessary before the actual production begins. Although most of these decisions are included in the phase III course analysis report, the accuracy and validity of that information tends to change during actual design and development. In some cases it appears necessary to re-examine those assumptions before the costs involved in actual production are incurred. Furthermore, many courses which are utilizing innovative formats or content structures require a careful field testing before they are "poured in concrete". Such demands dramatically change the production requirements and must be accommodated prior to phase V.

In summary, considerably more thought regarding the specific requirements, scheduling, and production flow of events occurring in phase IV is needed. In addition, more consideration of a flexible, yet rigorous, quality control system is required. Current efforts directed toward improving both of the above concerns do indicate that these problems can be resolved. However, preliminary evidence suggests that a change in the overall ISD model, especially between phases

IV and V, must occur before the problems are totally uncer control.

Phase V (Course Production)

Many of the problems encountered with phase V are discussed above in relationship to the transition between phases IV and V. However, looking primarily at the activity directly related to physical production of course materials other problems can be determined. One of the most sigrificant of these problems involves the relationship between persons involved in physical production (e.g., visual designers and editors) and others working on the course team (instructional designers and subject matter experts). Once the course team has produced a unit of material to their satisfaction, that material must then be given much more attention than simply having it reproduced for the student. Problems, in the form of delays and multiple drafts of course materials, begin to occur as production personnel begin to edit, paste-up, proof, and eventually reproduce the course. Such activity requires recycling various forms of course materials to all members of the course team to ensure the content or design of the materials has not changed due to production requirements. As many as 10 recycling points have been identified for some courses in order to produce a final draft suitable for delivery to the student. Coupled with the fact that the course team is still involved in phase IV design and development activity on other units in the course, a very complex set of interactions begin to take place. Unfortunately, the original version of the ISD model gave little direction as to the solution of this problem. Lack of direction in this area resulted in the creation of a variety of solutions, many idiosyncratic to the personalities, goals, and needs of a specific course team working on a specific course. Workers found themselves "caught up" in course related issues and had little time left to analyze the problems and create a more functional system.

A second major problem not handled systematically by the original ISD model involves the relationship between the type of production method chosen and the need to field test and modify the course. Although all new courses are slotted to be in a "field test" for the first year of actual delivery to students, the amount of change and modification possible on many of these courses was restricted due to their physical production form. That is, courses which underwent expensive printing and binding in first draft were found more difficult to change, especially when the changes recommended only directly affected a relatively minor proportion of the course materials. In contrast, producing less expensive and more flexible course materials for the field test was disruptive

to many persons in the institution who felt that all materials which reached student hands must be "first quality-" since it represented the majority of contact the student would have with the institution.

On the positive side, the ISD model greatly facilitated the planning and general organization of the production of courses. The information determined during the course analysis phase (Phase III) could be used to estimate the amount of production resources and personnel necessary, schedule courses through production to prevent overloads at peak times, and more accurately predict when materials would be on the shelf and ready for distribution to students.

Phase VI (Course Evaluation and Revision)

Since the implementation of the ISD model just over one year ago, few courses have been in phase VI long enough to reflect the utility of this sub-system. However, early indications do suggest that the amount of planning in course design, development and evaluation should greatly facilitate the amount of information available for revision purposes and the accuracy of that information in relationship to specific course changes. The actual scheduling and mechanism involved in the revision of course materials remains a problem. However, as the number of courses entering phase VI increases, more attention to the specifics of revision will occur.

By-products of ISD Implementation

In addition to the direct effects resulting from the implementation of ISD at Athabasca University, there were also indirect effects which resulted as by-products or "spin-offs". Areas such as student counseling, student recruitment, and tutorial services benefited from a more systematic approach to program and course planning, design, production, and delivery planning. Since these areas are impacted significantly by the content and design of courses, the ISD model allowed persons working in these areas to become much more aware of what courses would be ready, when they were scheduled to be available, what they covered, who they were for, and how they articulated with other university programs. Many of these issues were resolved as early as phase III (course analysis) allowing a considerable lead time for the organization of student recruiting and counseling.

The ISD model also increased the communication between groups engaged in instructional endeavors and those engaged in student support activity and administrative activity. The ISD model gave everyone a common set of terms to describe the various

phases programs and courses go through prior to delivery to the student. The phasing terminology became standard institutional jargon by almost everyone even remotely concerned with courses and/or students. Secondly, the planning, budgeting, and institutional decision making process at all levels was made easier using the ISD model as a guide. It became common to plan for resources in each phase of the ISD model and budget accordingly. Third, review committees and units within the institution could be kept regularly informed regarding the progress of programs and courses as they moved from one phase to another. Progress could be compared to proposed scheduling plans which allowed interested groups to make decisions regarding changes in priority almost immediately. Fourth, the ISD model allowed the relationship between the university and outside consultants involved in course preparation to become much more meaningful. Consultants could be paid according to the task they were involved in in each phase. Contracts could be written to correspond to the decision making process related to each phase, preventing the institution from becoming contractually committed for course development before the analysis report (phase III) was approved. Finally, it became much easier to determine the actual costs of engaging in various activities related to program and course planning, design, production, and evaluation. Future allocations of budget could be determined much more accurately based on the costing information obtained for each phase in the ISD MODEL.

Conclusion

The application of a complex ISD model at Athabasca University has many implications, both theoretical and practical, for educational institutions in general, and innovative post-secondary institutions in particular. The results clearly indicate that the linkage between instructional theory and application can be made. It's doubtful whether the successful application of instructional technology can result without the proper management of human resources and products. Instructional Systems Design provides the mechanism for the integration of instructional theory and management. Although the importance of such an integration has been addressed previously, (Colceway, 1977) the present study exemplifies the results of such an integration in a highly complex educational environment.

The results of this study also indicate the importance of ISD in educational change. Geis (1977) indicated that educational change is made difficult when all innovation must accommodate to the existing administrative and support systems in the educational institutions. In contrast, the present study indicates that innovation is entirely possible when a system, such

as ISD, provides the guidance to administration rather than necessitating that administrative procedures be developed outside of the instructional theory.

The implementation of a complex ISD model at Athabasca University has greatly facilitated the responsiveness of the institution to its primary goal, the production of courses and their successful delivery to students. ISD continues to flourish and grow at Athabasca University. An expansion and update (i.e., a second generation ISD model) of the existing model is planned and should occur sometime during the Spring, 1979. The second generation model will expand the influence of ISD to other important areas within the institution. In addition, the second generation model will attempt to capitalize upon the results of the first generation model and overcome weaknesses already discussed in this paper. The second generation model will also allow Athabasca University to become much more flexible in the creative planning, design, and production of courses. Based upon the experience and effects of the first generation model, Athabasca University is ready to put into place a much more dynamic ISD model capable of handling a much wider range of problems without sacrificing the strengths inherent in ISD.

Many of the specific ISD concepts in use at Athabasca University could also be used effectively at other innovative and traditional post-secondary educational institutions. Although the specifics of any ISD model must be designed to meet the specific problems faced by individual institutions, the importance of ISD for post-secondary education should not be overlooked. Systems concepts, even when used in very simple and direct ways, appear to have considerable organization and management power, especially in environments in which organization and management are typically of lower priority and/or difficult due to a lack of direct managerial control. ISD not only provides guidelines for scheduling, planning, and production, but greatly opens the possibility of participative management. Almost anyone and everyone involved in any phase of the ISD model can be instrumental in the refinement of a basic ISD model and participate in decisions that affect the overall process. As long as inputs are made to enhance or upgrade the ISD model, they can easily be integrated into the system. Ideas which are not useful or produce difficulty are quickly "weeded out" and replaced by more functional concepts. This cybernetic process becomes even more powerful as the demands for output from the system increase (e.g., more courses, faster production, new programs, etc.)

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A Complex Instructional Systems Design Model

for Post-Secondary Education

First Draft

Prepared for SIG on Systems Research, A.E.R.A. Symposium #22.21

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UNIX File Name: ppr/ir/globals.1

Number of Words: 951

Athabasca University is an open-admissions institution with a mandate to provide post-secondary educational services to those adults in Alberta who, because of constraints of time and place, would not otherwise have access to such services. Consequently, the university specializes in developing self-instructional courses that are delivered at a distance and supported in the field by a network of tutors. The university was also directed to be innovative in how it provided these services. Unfortunately, because the demand for such services has been perceived to date to be small, the Alberta government has provided the university with quite a limited resource base on which to proceed. All of these considerations, in one sense or another, have constrained the way in which Athabasca University has developed and delivered instruction.

In its earliest days, the university attempted to produce instruction through a smorgasbord of procedures. Although it made several attempts at formulating university-wide goals and at program planning, decisions about which courses to develop often boiled down to whether there was a proponent for the course within the university and how politically acept that proponent happened to be. A decision about whether to offer a course was made in the absence of any sense of operational implications. Consequently, as a course "progressed" through development, it was often found that something had to be added on to the organization before the course could proceed much further.

The problem

It became very apparent in a short period of time that the university's "reactive" policies and procedures for developing courses were largely dysfunctional, leading the university into a management-by-critical-incident level of functioning. Some of the symptoms of this dysfunctional condition were: (i) courses were taking extremely long to produce (in some cases, as long as 3-5 years); (ii) scheduling of production was impossible and deadlines were meaningless because they had no rational basis or they were impossible to meet; (iii) materials (if they managed to get produced) were of very uneven quality and sometimes were in such disarray that they were useless to students; (iv) the numbers of student enrolments were very low and student progress through courses poor; (v) there were many false starts on courses (in some cases, courses that had been under development for a year were discontinued or revamped so extensively that a fresh start was necessary; (vi) materials were lost or misplaced during the production process and last minute changes often occurred causing considerable perturbation in the production system and in staff relations; (vii) considerable periods of time were wasted in what passed for planning activity but which, in fact, turned out to be fruitless navel-gazing; (viii) courses were costing immense sums to produce; (ix) the production flow was uneven and

irregular; (x) components had to be tacked on to the instructional system to support perceived deficiencies in course design.

An analysis of these specific symptoms indicates that part of the problem was due to a faulty (or absent) management structure in which responsibilities were unclear, authority and the decision-making process was obscure, and little or no accountability existed. Another part of the problem - one highly related to the first - was that there was an almost complete confounding of policy matters and management matters. As a consequence, there were many attempts to manage through policy bodies and a usual solution to a critical incident was to introduce more policy. The symptoms persisted, however, and became more chronic as the university expanded its instructional activities. Clearly what was needed was a system that would: force the separation of policy and management considerations; assign these various considerations appropriately to the existing policy bodies and management structures within the university; force a delineation of responsibilities and authority; build in an accountability structure; and introduce feedback loops that would allow the process to be continually monitored and evaluated.

Organization of Athabasca University

At this point, it is necessary to explain briefly aspects of the organization of Athabasca University so that the way in which the ISD model was implemented and the specific operational form it took may be made more comprehensible. The university operates under a unicameral governance system which - to state it simplistically - means that the power that is vested in both the senate and the general faculties council in a traditional university are vested in one body at Athabasca University - the Governing Council. In addition, there are two bodies that make policy recommendations to the Governing Council through the President of the university. One of these deals with policy issues that concern administrative matters. The other deals with policy and planning relating to academic matters (APPC for short), and so far as the ISD model is concerned this is the key committee. The operations of the university are split in the traditional manner (see Figure 1) into an administrative component (University Services) and an academic component (Learning Services), each headed by a vice-president. Learning Services is comprised of a number of sub-units, each of which addresses itself to some aspect of the instructional process. Course development, as the name implies, develops the course materials. The unit relies on subject matter consultants (or academics) drawn from outside the university, and from academic staff attached to the program areas. When the Course Development unit has completed work on a course, it is turned over to Course Coordinators (who are housed administratively in the Programs) and to Course Tutors (who are housed in Tutorial Services) for delivery to students. The roles

of the other units may be inferred from their titles and won't be elaborated on here since they are only indirectly involved in the instructional systems design.

The Athabasca University ISD Model

As can be seen from Figure 2, the A.U. ISD Model has six readily identifiable and well delineated phases. Each phase subsumes a set of tasks that are largely operationally defined by the specification of what should result from that phase. It further specifies the kinds of decisions that should be made on the basis of what results from each phase. A group of individuals, designated as the "workers", are responsible for producing the results that have been specified. In addition, a quality control agent is designated to monitor the outputs of the working group. Subsequent presentations in the symposium will deal with various of the phases in some detail. However, the following general observations can be made about the model:

i. the issues treated in the early phases are essentially policy- level issues; issues treated in the latter phases are essentially management-level issues (Phase III, which will be described in some detail in a subsequent presentation, treats both levels of issues).

ii. in the early phases, quality control is exercised by policy-making bodies within the university; as we move toward the latter phases, quality control is exercised by management bodies or by specific managers.

iii. in the early phases, the "worker groups" are like task forces in the sense that they usually consist of a number of individuals drawn from across the university; they are convened for specific purposes and they generally do not continue as a formalized body. In the latter phases, the worker groups correspond to existing organizational units within the university.

iv. the phasing ensures that critical *a priori* questions are answered before attempts are made to deal with questions that can be sensibly answered only if certain pre-conditions hold.

v. each of the phases forces the gathering of new information so that the decision-making process becomes more refined at each stage in the model.

vi. the model clearly delineates responsibilities and contains mechanisms that forcibly induce accountability in the system.

vii. the phasing approach forces a continuous re-examination of a course as it moves through the process and provides a number of escape loops that permit abortive courses to be removed from the system.

Implementation of the model

The model was introduced to the university as a policy issue. It was presented to the Academic Policy and Planning Committee (APPC) in October 1977 and ratified as a university policy. As well as immediately resolving some of the problems the APPC was having in defining its role in the program planning, course development process, the model also forced a resolution of a large number of managerial problems because it was so prescriptive in specifying who was to do what and for what reasons.

Current status of the university with respect to the model.

The university had produced a long range plan (5 years) approximately nine months prior to the implementation of the ISD model. This plan is examined on a regular basis and operational objectives are derived or refined from it. So the university is well ensconced in the activities of Phase I. As a consequence of this long range plan, the university is expending a substantial amount of time in program planning activities. The university is currently well-advanced in Phase II activities in two areas - Liberal Studies and Administrative Studies. (It is worth noting that Phase II activities in the general area of Helping Services resulted in a decision not to pursue the development of a program in this area). Because of the circumstances surrounding Athabasca University's inception and its mandate to be innovative, it has always been under considerable pressure to produce - the usual indices being numbers of courses and numbers of students. Consequently, most of the university's instructional activities have been, and continue to be, focussed on Phases III, IV and V project analysis, course design and development, and course production. Only recently have we evolved to a point where we need to consider Phase VI activities, and the university has yet to come solidly to terms with this aspect of the model.

FIGURE ONE: Athabasca University
organization chart as of
March 31, 1978

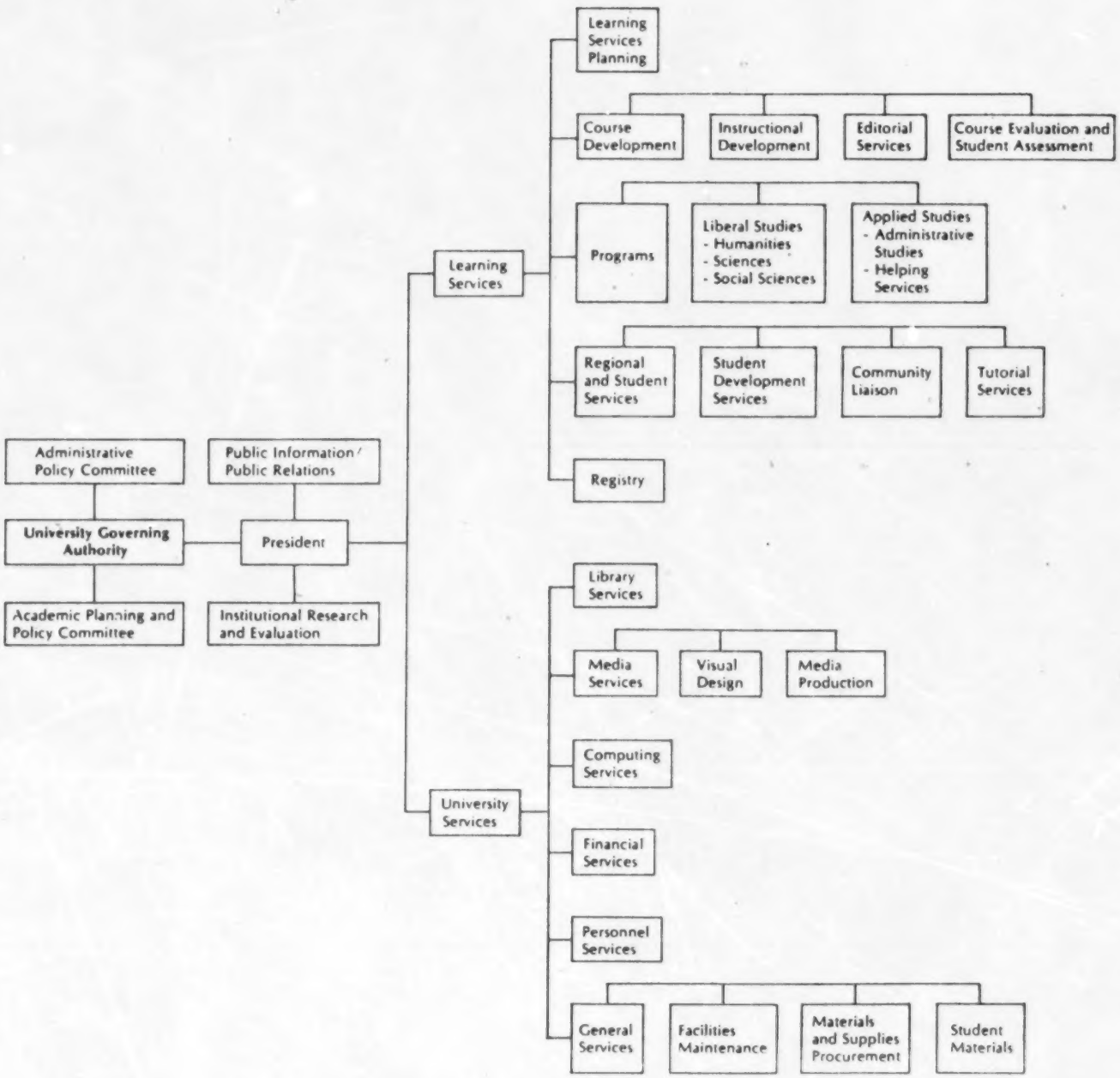

FIGURE TWO: THE ATHABASCA UNIVERSITY ISD MODEL

ISD MODEL

PHASE	WORKERS	QUALITY CONTROL	RESULTS	DECISIONS
1. ON-GOING REVIEW AND SPECIFICATION OF THE UNIVERSITY DEV. PLAN (LONG RANGE PLAN)	DEV. PLAN COMMITTEE	GOV. COUNCIL ACADEMIC PLANNING & POLICY COMMITTEE (A.P. & P.C.)	GUIDELINES FOR PROGRAM SELECTION AND LONG-RANGE PLANNING	- CONTINUE LONG RANGE - GO TO PROGRAM ANALYSIS
11. PROGRAM ANALYSIS				
A. ON GOING ANALYSIS OF THE UNIV. DEV. PLAN PROGRAMS.	PROGRAM ANALYSIS GROUP	A.P. & P.C.	- SPECIFIC PROGRAM RECOMMENDATIONS	- BEGIN PHASE #3 EFFORTS ON COURSES
B. SPECIFIC PROGRAM ANALYSIS.	PROGRAM ANALYSIS TEAM		- GUIDELINES FOR ALLOCATING RESOURCES	- GATHER MORE PROGRAM DATA
			- GUIDELINES FOR MONITORING PROGRAM ANALYSIS PROCEEDINGS	- HOLD FOR LATER EFFORTS
			- IDENTIFICATION OF TARGET GROUPS	- INTEGRATE PROGRAM WITH OTHER PROGRAMS
111. COURSE ANALYSIS				
A. COURSE CONTENT ANALYSIS	COURSE PLANNING TEAM	VICE-PRESIDENT & A.P. & P.C.	- SPECIFIC COURSE OBJECTIVES	- GO
			- IDENTIFICATION OF S.M.E.	- STOP: NO S.M.E.
B. RESOURCE/ MANAGEMENT ANALYSIS	COURSE PLANNING TEAM	VICE-PRESIDENT & LEARNING SERVICES MANAGEMENT GROUP	- COURSE SIZE	- STOP: S.M.E. UNPREPARED
			- MANAGEMENT PLAN	- GO: REWORK CURRICULUM
			- DELIVERY SPECIFICATIONS	- GO: REVISE CONTENT
				- STOP: TOO COSTLY

FIGURE TWO: THE ATHABASCA UNIVERSITY ISD MODEL

ISD MODEL

PHASE	WORKERS	QUALITY CONTROL	RESULTS	DECISIONS
IV. COURSE DESIGN AND DEVELOPMENT	COURSE DEV. TEAM (S.M.E., I.D., EDITOR, VISUAL DESIGNER)	DIRECTOR, COURSE DEVELOPMENT (A.P. & P.C. INPUT, IF REQUIRED	UNITS & LESSONS QUIZZES & EXAMS. IMP./DEL. PLANS GRAPHIC DECISIONS DELIVERY SPECIFICATIONS COMPLETED FIRST DRAFT	INCREASE AUTHOR REPORT INCREASE AUTHOR TRAINING PROVIDE CONSULTATIVE SUPPORT CONDUCT I.D. TRAINING RESOLVE INTERPERSONAL PROBLEMS RE-STRUCTURE TEAM CHANGE OBJECTIVES
V. COURSE PRODUCTION	COURSE PRODUCTION	COURSE DEVELOPMENT TEAM/MANAGERS	COMPLETED DELIVERY DRAFT	GO WITH LIMITED TESTING GO WITH ROUGH PRINT/COPY GO WITH FINISHED COPY
VI. EVALUATION AND REVISION	COURSE DEV. TEAM AND EVALUATION TEAM	PROGRAM PLANNING COMM. & VICE-PRESIDENT	DATA AND REVISION PLANS	REVISE TERMINATE